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**George C. Marshall Space Flight Center**  
Marshall Space Flight Center, Alabama 35812

QD01

## MULTIPROGRAM/PROJECT COMMON-USE DOCUMENT

### **MSFC TAILORING GUIDE FOR NASA-STD-8739.2, WORKMANSHIP STANDARD FOR SURFACE MOUNT TECHNOLOGY**

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## DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		02/05/99	Initial release.
Revision	A	01/12/01	Reformatted document to new template. Replaced NAS 5300.4(3M) with NASA-STD-8739.2 and corrected all paragraph references. Replaced reference to MIL-STD-1686 with ANSI/ESD S20.20-1999. Deleted reference to ANSI/NCSL Z540-1-1994 since it is now referenced in NASA-STD-8739.2. Deleted reference to J-STD-004 and J-STD-006 since they are now referenced in NASA-STD-8739.2.
Revision	B	04/18/05	Updated document per NASA Headquarters Rules Review. Updated "SCOPE" to reflect changes due to reorganizations of the Safety & Mission Assurance (S&MA) and Engineering Directorates. Updated "APPLICABLE DOCUMENTS" to remove canceled, or add replacement documents. Deleted MIL-C-85447 since it has been canceled without replacement. Replaced O-T-620 with ASTM D4126, which supersedes O-T-620.
Revision	C	06/21/06	Updated "Training Resources" information in paragraph 5.5.

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## FOREWORD

This standard sets forth MSFC tailoring requirements for NASA-STD-8739.2. These requirements shall be invoked by drawings and specifications for flight hardware and critical support equipment.

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## 1. SCOPE

1.1 Scope. This tailoring guide sets forth the Marshall Space Flight Center (MSFC) exceptions to the use of NASA-STD-8739.2, Workmanship Standard for Surface Mount Technology, dated August 31, 1999. This tailoring guide was prepared jointly by the Safety, Reliability & Quality Assurance (SR & QA) Policy and Assessment Department and the Electrical, Electronic, and Electromechanical (EEE) Parts, Packaging & Assembly Branch of the Instrument & Payload System Department. This guide shall be used on contracts and for in-house work.

## 2. APPLICABLE DOCUMENTS

### 2.1 Marshall Space Flight Center (MSFC).

<u>Document Number</u>	<u>Title</u>
MSFC-RQMT-2918	Requirements for Electrostatic Discharge Control

### 2.2 NASA

<u>Document Number</u>	<u>Title</u>
NASA-STD-8739.2	Workmanship Standard for Surface Mount Technology

### 2.3 Military Standards.

<u>Document Number</u>	<u>Title</u>
MIL-C-81302	Cleaning Compound, Solvent, Trichlorotrifluoroethane
MIL-T-81533	Trichloroethane 1, 1, 1 (Methyl Chloroform) Inhibited, Vapor Degreasing

### 2.4 American National Standards Institute.

<u>Document Number</u>	<u>Title</u>
ANSI/J-STD-005	Requirements for Soldering Pastes
ANSI/ESD S20.20-1999	ESD Association Standard for the Development of an Electrostatic Discharge Control Program for –Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)

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## 2.5 American Society for Testing and Materials

<u>Document Number</u>	<u>Title</u>
ASTM D4126	Vapor-Degreasing Grade and General Solvent Grade 1, 1, 1– Trichloroethane

## 3. DEFINITIONS

3.1 Acronyms used in this standard. The acronyms used in this standard are defined as follows:

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
EEE	Electrical, Electronic, and Electromechanical
ESD	Electrostatic Discharge
MSFC	Marshall Space Flight Center
PTH	Plated-Thru-Hole
SR&QA	Safety, Reliability, and Quality Assurance
SMT	Surface Mount Technology

## 4. GENERAL REQUIREMENTS

None.

## 5. DETAILED REQUIREMENTS

The following exceptions to NASA-STD-8739.2 shall apply.

5.1 Exclude paragraph 5.3, Certification Levels.

5.2 In paragraph 5.4.3.a, exclude “Level B”.

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5.3 Exclude paragraph 5.6.2 and replace with the following: “Recertification shall include demonstration of proficiency. Demonstration of proficiency shall be accomplished by retraining/retest, sample preparation/inspection, or a documented audit of actual work performed. The recertification procedure shall be documented by the supplier.”

5.4 Modify paragraph 5.6.3.d to require recertification every three years.

5.5 Replace paragraph 5.7 titled “Training Resources” with the following: “Training shall be obtained from a school approved by a technical advisor and the MSFC Certifying Officer. Contact the MSFC Certifying Officer within the Safety and Mission Assurance (S&MA) organization for an approved training school.”

5.6 Replace paragraph 6.5, Electrostatic Discharge Requirements, with the following: “The supplier shall implement an electrostatic discharge (ESD) Control Program. ESD requirements shall be in accordance with ANSI/ESD S20.20-1999 or other approved ESD control procedures. This program shall define the ESD control requirements for any activity that tests, inspects, services, manufacturers, installs, packages, labels or otherwise processes ESD sensitive parts or assemblies. All personnel who handle static-sensitive parts and assemblies shall have been trained in the proper procedures and in the use of appropriate protective equipment to prevent ESD damage. ESD requirements for MSFC in-house work shall be in compliance with MSFC-RQMT-2918, Requirements for Electrostatic Discharge Control.”

5.7 Change paragraph 6.7.1.c to: “Prohibit the use of soldering guns and surface contact heater bar reflow devices.”

5.8 Add the following to paragraph 6.13: “Water soluble fluxes and acid type fluxes shall not be allowed for hand soldering.”

5.9 Add the following to bottom portion of Table 6-2, Solvents and Cleaners:

Cleaners	Specification/Note
Terpene or hydrocarbon bench cleaners	(See 6.14)

5.10 Add the following items to paragraph 6.14 :

- a. 6.14.6 Terpene or hydrocarbon bench cleaners such as BioAct EC7-M, Axarel 36, or KNI-2000 shall be acceptable provided other compatible solvents are used to remove their residue. Other bench cleaners may be used if data supporting their cleaning capability is submitted to the NASA procuring organization and they are approved prior to use.

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b. 6.14.7 Trichlorotrifluoroethane (MIL-C-81302, Type II) and 1,1,1-Trichloroethane (MIL-T-81533 and ASTM D4162) may be used until supplies on-hand are depleted and if allowed by regulation.

5.11 Replace paragraph 7.3 with the following: “The user shall perform the tests/inspections as specified in ANSI/J-STD-005, Table 4. The test/inspection frequency shall be defined and documented in the user’s internal procedures. The results shall be documented and available for review.”

5.12 Add the following as paragraph 7.5, SMT Process Qualification: “Prior to initiating SMT manufacturing using mass reflow equipment or multiple lead reflow equipment, the fabricator shall prove the repeatability of the process by sample production runs. The qualification plan and results shall be documented and available for review.”

5.13 Add the following as paragraph 7.6, Part Selection: “Surface mount devices with non-compliant leads (i.e. I-leads, leadless chip carriers) shall not be allowed for MSFC work without prior approval by the procuring organization.”

5.15 In paragraph 8.8, the results of parts placement and alignment inspections shall not require to be documented.

5.16 Exclude paragraph 9.2.1, since heater bar reflow soldering is not allowed for MSFC work.

5.17 In paragraph 12.6, solder paste application and part alignment examinations prior to reflow of SMT assemblies shall be accomplished by manufacturing personnel provided this is allowed by project or contract requirements.

5.18 Replace paragraph 12.8.2.c.1 with the following: “Separation of conductor pattern from substrate except lifting of pads after PTH soldering shall be acceptable if the pad is not lifted more than .001 inch half-way to the hole.”

## 6. NOTES

This document replaces MSFC-STD-2904 dated April 18, 2005.